

Práctica 2 SWAP

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1. Copia de archivos

En primer lugar vamos a crear un directorio local en m1:

```
xuzheng@m1-xuzheng:~$ ls
cookies.txt  imagen.png  logo3w.png
xuzheng@m1-xuzheng:~$ mkdir dir_m1
xuzheng@m1-xuzheng:~$ mv imagen.png logo3w.png dir_m1
xuzheng@m1-xuzheng:~$ ls
cookies.txt  dir_m1
xuzheng@m1-xuzheng:~$ ls dir_m1/
imagen.png  logo3w.png
xuzheng@m1-xuzheng:~$
```

Vamos a enviar este directorio a m2 mediante **tar** y **ssh**:

```
xuzheng@m1-xuzheng:~$ tar -czf - dir_m1/ | ssh -p 2222 xuzheng@192.168.56.71 'cat > ~/dir_m1.tgz'
xuzheng@m1-xuzheng:~$
```

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```
xuzheng@m2-xuzheng:~$ ls
cookies.txt  dir_m1.tgz  imagen.png  logo3w.png
xuzheng@m2-xuzheng:~$
```

Comprobamos descomprimiendo el archivo tar:

```
xuzheng@m2-xuzheng:~$ tar -xzf dir_m1.tgz
xuzheng@m2-xuzheng:~$ ls
cookies.txt  dir_m1  dir_m1.tgz  imagen.png  logo3w.png
xuzheng@m2-xuzheng:~$ ls dir_m1
imagen.png  logo3w.png
xuzheng@m2-xuzheng:~$ _
```

Esto también lo podemos llevar a cabo mediante **scp**. Puesto que habíamos configurado **SSH** en el puerto 2222, necesitamos indicarlo con el argumento **-P**:

```
xuzheng@m1-xuzheng:~$ scp -P 2222 -r dir_m1/ xuzheng@192.168.56.71:~/dir2_m1
logo3w.png          100% 6748    4.5MB/s   00:00
imagen.png          100% 6748    6.4MB/s   00:00
xuzheng@m1-xuzheng:~$
```

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```
xuzheng@m2-xuzheng:~$ ls
cookies.txt  dir2_m1  dir_m1  dir_m1.tgz  imagen.png  logo3w.png
xuzheng@m2-xuzheng:~$ ls dir2_m1/
imagen.png  logo3w.png
xuzheng@m2-xuzheng:~$ _
```

2. RSync

En este apartado vamos a utilizar **rsync** para sincronizar ambas máquinas (de m1 a m2). En este caso, la herramienta ya está instalada por defecto. En primer lugar, necesitamos dar privilegio al usuario sobre la carpeta donde están los archivos del servidor web:

```
xuzheng@m1-xuzheng:~$ sudo chown xuzheng:xuzheng -R /var/www
[sudo] password for xuzheng:
xuzheng@m1-xuzheng:~$ _
```

Para probar, vamos a sincronizar la carpeta anterior:

```
xuzheng@m1-xuzheng:~$ rsync /var/www/ -avz -e 'ssh -p 2222' 192.168.56.71:/var/www/
sending incremental file list
rsync: chgrp "/var/www/." failed: Operation not permitted (1)
./
rsync: recv_generator: mkdir "/var/www/ejemplo" failed: Permission denied (13)
*** Skipping any contents from this failed directory ***
rsync: recv_generator: mkdir "/var/www/html" failed: Permission denied (13)
*** Skipping any contents from this failed directory ***
ejemplo/
html/

sent 242 bytes  received 379 bytes  414.00 bytes/sec
total size is 11,072  speedup is 17.83
rsync error: some files/attrs were not transferred (see previous errors) (code 23) at main.c(1207)
sender=3.1.3)
xuzheng@m1-xuzheng:~$ _
```

Podemos ver que en este caso no ha sido posible transferir la carpeta porque no tenemos permiso para escribir sobre ella. Si examinamos la carpeta `/var` en `m2`:

```
xuzheng@m2-xuzheng:~$ ls -l /var/
total 48
drwxr-xr-x  2 root root   4096 mar 11 09:44 backups
drwxr-xr-x 13 root root   4096 mar  8 17:21 cache
drwxrwxrwt  2 root root   4096 ago 31 2022 crash
drwxr-xr-x 46 root root   4096 mar  8 17:21 lib
drwxrwsr-x  2 root staff  4096 abr 15 2020 local
lrwxrwxrwx  1 root root     9 ago 31 2022 lock -> /run/lock
drwxrwxr-x 11 root syslog 4096 mar 22 20:13 log
drwxrwsr-x  2 root mail  4096 ago 31 2022 mail
drwxr-xr-x  2 root root   4096 ago 31 2022 opt
lrwxrwxrwx  1 root root     4 ago 31 2022 run -> /run
drwxr-xr-x  5 root root   4096 ago 31 2022 snap
drwxr-xr-x  4 root root   4096 ago 31 2022 spool
drwxrwxrwt  7 root root   4096 mar 22 20:18 tmp
drwxr-xr-x  2 root root   4096 mar 22 21:01 www
xuzheng@m2-xuzheng:~$ _
```

nos damos cuenta de que sólo `root` tiene permiso para escribir sobre ella. Podemos otorgar el permiso al usuario en `m2` también:

```
xuzheng@m2-xuzheng:~$ sudo chown xuzheng:xuzheng -R /var/www/
[sudo] password for xuzheng:
xuzheng@m2-xuzheng:~$
```

Y volvemos a intentar:

```
xuzheng@m1-xuzheng:~$ rsync /var/www/ -avz -e 'ssh -p 2222' 192.168.56.71:/var/www/
sending incremental file list
./
ejemplo/
ejemplo/public_html/
ejemplo/public_html/index.html
html/
html/index.html
html/snap.html

sent 3,619 bytes  received 92 bytes  7,422.00 bytes/sec
total size is 11,072  speedup is 2.98
xuzheng@m1-xuzheng:~$ ls -la /var/www/
total 16
drwxr-xr-x  4 xuzheng xuzheng 4096 mar 11 10:41 .
drwxr-xr-x 14 root     root    4096 mar  8 17:21 ..
drwxr-xr-x  3 xuzheng xuzheng 4096 mar 11 10:41 ejemplo
drwxr-xr-x  2 xuzheng xuzheng 4096 mar 11 10:15 html
xuzheng@m1-xuzheng:~$
```

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```
xuzheng@m2-xuzheng:~$ ls -la /var/www/
total 16
drwxr-xr-x  4 xuzheng xuzheng 4096 mar 11 10:41 .
drwxr-xr-x 14 root     root    4096 mar 22 21:01 ..
drwxr-xr-x  3 xuzheng xuzheng 4096 mar 11 10:41 ejemplo
drwxr-xr-x  2 xuzheng xuzheng 4096 mar 11 10:15 html
xuzheng@m2-xuzheng:~$ _
```

Podemos ver que ahora sí se ha sincronizado correctamente.

2.1. Opciones avanzadas

En la sincronización que hemos realizado anteriormente se ha utilizado los siguientes argumentos:

- **-a**: la transferencia se realiza en modo archivo, lo que asegura que los permisos, atributos, enlaces, etc se preserven y que la transferencia sea recursiva.
- **-v**: modo verbose, para dar más información.
- **-z**: comprime los archivos durante la transferencia.
- **-e**: determina el shell remoto a utilizar.

Como opciones avanzadas vamos a utilizar **—exclude** para evitar que se copie la carpeta `/var/www/img` que vamos a crear, además vamos a copiar un archivo txt en `/var/www` para eliminarlo después:

```
kuzheng@m1-xuzheng:~$ mkdir /var/www/img
kuzheng@m1-xuzheng:~$ cp dir-m1/logo.png /var/www/img/
kuzheng@m1-xuzheng:~$ cp cookies.txt /var/www/
kuzheng@m1-xuzheng:~$ ls -la /var/www/
total 24
drwxr-xr-x  5 xuzheng xuzheng 4096 mar 22 21:57 .
drwxr-xr-x 14 root    root    4096 mar  8 17:21 ..
-rw-rw-r--  1 xuzheng xuzheng 591 mar 22 21:57 cookies.txt
drwxr-xr-x  3 xuzheng xuzheng 4096 mar 11 10:41 ejemplo
drwxr-xr-x  2 xuzheng xuzheng 4096 mar 11 10:15 html
drwxrwxr-x  2 xuzheng xuzheng 4096 mar 22 21:57 img
kuzheng@m1-xuzheng:~$ rsync /var/www/ -avz --exclude=img -e 'ssh -p 2222' 192.168.56.71:/var/www/
sending incremental file list
./
cookies.txt
sent 736 bytes received 41 bytes 518.00 bytes/sec
total size is 11,663 speedup is 15.01
kuzheng@m1-xuzheng:~$

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kuzheng@m2-xuzheng:~$ ls -la /var/www/
total 20
drwxr-xr-x  4 xuzheng xuzheng 4096 mar 22 21:57 .
drwxr-xr-x 14 root    root    4096 mar 22 21:01 ..
-rw-rw-r--  1 xuzheng xuzheng 591 mar 22 21:57 cookies.txt
drwxr-xr-x  3 xuzheng xuzheng 4096 mar 11 10:41 ejemplo
drwxr-xr-x  2 xuzheng xuzheng 4096 mar 11 10:15 html
kuzheng@m2-xuzheng:~$
```

Podemos ver que ha excluido la carpeta `/var/www/img` de la sincronización y sólo ha sincronizado el archivo txt. Ahora vamos a eliminar este archivo txt y probar con la opción **—delete**:

```
kuzheng@m1-xuzheng:~$ rm /var/www/cookies.txt
kuzheng@m1-xuzheng:~$ rsync /var/www/ -avz --delete --exclude=img -e 'ssh -p 2222' 192.168.56.71:/var/www/
sending incremental file list
deleting cookies.txt
./
sent 252 bytes received 37 bytes 192.67 bytes/sec
total size is 11,072 speedup is 38.31
kuzheng@m1-xuzheng:~$

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kuzheng@m2-xuzheng:~$ ls -la /var/www/
total 16
drwxr-xr-x  4 xuzheng xuzheng 4096 mar 22 21:58 .
drwxr-xr-x 14 root    root    4096 mar 22 21:01 ..
drwxr-xr-x  3 xuzheng xuzheng 4096 mar 11 10:41 ejemplo
drwxr-xr-x  2 xuzheng xuzheng 4096 mar 11 10:15 html
kuzheng@m2-xuzheng:~$
```

Podemos ver que como se ha eliminado el archivo en la máquina origen, también se ha borrado en la máquina destino.

3. SSH

En la práctica anterior, ya se configuró **ssh** para permitir el acceso sin contraseña utilizando **ssh-keygen** y **ssh-copy-id**. Para este apartado, vamos a borrar las claves y volver a generarlas:

```
kuzheng@m1-xuzheng:~$ rm .ssh/id_rsa .ssh/id_rsa.pub
kuzheng@m1-xuzheng:~$ _

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kuzheng@m2-xuzheng:~$ rm .ssh/id_rsa .ssh/id_rsa.pub
kuzheng@m2-xuzheng:~$
```

Además necesitamos eliminar los contenidos de los archivos `.ssh/known_hosts` y `.ssh/authorized_keys`:

```
xuzheng@m1-xuzheng:~$ cat .ssh/known_hosts
xuzheng@m1-xuzheng:~$ cat .ssh/authorized_keys
xuzheng@m1-xuzheng:~$
```

Ahora al intentar conectar nos pedirá la contraseña:

```
xuzheng@m1-xuzheng:~$ ssh -p 2222 xuzheng@192.168.56.70
The authenticity of host '192.168.56.70 (2222: [192.168.56.70]:2222)' can't be established.
ECDSA key fingerprint is SHA256:1Hb1eSchFqX0PffltUyF0vSvha0kFEV0VlnydcQL8.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.56.70:2222' (ECDSA) to the list of known hosts.
xuzheng@192.168.56.70's password:
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.4.0-144-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

System information as of vie 24 mar 2023 15:36:46 UTC

System load:  0.07               Processes:    122
Usage of /:   42.2% of 8.02GB    Users logged in: 1
Memory usage: 14%              IPv4 address for enp0s3: 10.0.2.15
Swap usage:  0%                 IPv4 address for enp0s8: 192.168.56.70

25 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '22.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Fri Mar 24 15:30:21 2023 from 192.168.56.70
xuzheng@m1-xuzheng:~$ exit
logout
Connection to 192.168.56.70 closed.
xuzheng@m1-xuzheng:~$
```

Vamos a generar las nuevas claves de tipo `rsa` y 4096 bits en ambas máquinas:

```
xuzheng@m1-xuzheng:~$ ssh-keygen -b 4096 -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/xuzheng/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/xuzheng/.ssh/id_rsa
Your public key has been saved in /home/xuzheng/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:6uBV81Q1Cf1Af3xAntG0ngTedMeIXyE+eDFc3VegHs8 xuzheng@m1-xuzheng
The key's randomart image is:
+---[RSA 4096]-----+
| . O++O.. ... |
| . O..OO= . . + |
| . +O. . . OO.O+ |
| . ++. . . =*+ O |
| ... O S ..=ME . |
| . . + . O.... |
| O + |
| . + |
+---[SHA256]-----+
```

```
xuzheng@m2-xuzheng:~$ ssh-keygen -b 4096 -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/xuzheng/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/xuzheng/.ssh/id_rsa
Your public key has been saved in /home/xuzheng/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:g0hceI6pS03CSHueKKyZvI17sJNpHQcu0c4u0iBe2k xuzheng@m2-xuzheng
The key's randomart image is:
+---[RSA 4096]-----+
| *.O |
| |O*.O |
| |XXE. |
| |XO+O . |
| |*+ . . . S |
| |.+++ O |
| |+O+.* |
| |*= B |
| |== |
+---[SHA256]-----+
```

Ahora en lugar de utilizar `ssh-copy-id` vamos a utilizar `scp` para copiar la clave pública de una máquina al archivo `.ssh/authorized_keys` de otra:

```
xuzheng@m1-xuzheng:~$ scp -P 2222 .ssh/id_rsa.pub xuzheng@192.168.56.71:~/.ssh/authorized_keys
xuzheng@192.168.56.71's password:
id_rsa.pub 100% 744 1.2MB/s 00:00
xuzheng@m1-xuzheng:~$
```

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```
xuzheng@m2-xuzheng:~$ cat .ssh/authorized_keys
ssh-rsa AAAAB3QzaC1uc2EAAHARQhAAHARQDnXfakd0V78gTepP0tC6PffEt6Hst1wvV5pIn0V93ambSrc/ZhOmpaJJYhw
sew421mcX0D091Hd+4Q0SLqy3XJQh0Yvuh0E4HNRN0C13mUx1qNRc19/1JNauyAT1gVbL1It1fmcvTEKSVdGT121V8Bdk
u7u7b3MDMgk1q0VkkGc5ZTSQAG2k9Mwun0UHQ308+T100g2p/G1sqR8mzCRNovGvTc2HqmrU1aaZVFuM7/4260010Tr/BXGxID5
TF4PRNAQfJT60fCfCJM2Rt6q1f89ek50xqzU0hk2JTKnnud1Uqo6V8pKz2FJT/91am6Rn91nG24h/gfekKClpISV2UsvhdSeJ
n02c5MnUSXLM/1KX11b02FYK+5Vbu1Bf5p6HCEQ2+YF8qL/3CVJp/0UFPF4f20uYT1PbHIEBJC1s2+0U62q59H7avKFN51Cf4
WN6g1H3uF8EJPA027v40p26duHfCq1Z21RC08HFC0c621062+OKR0dEhw3yde07/nlv8x6HNR1nK2e5FOCKWwN15f
ToIk27X05JhpJTLhuw/12dk8Ro1zhB6P4PE13dfA7BS76uSVW11JL12PnT17Vrrq1qxEBKmuK8CA/Hs4NfzHrd4V60aX25
HmoJRjQdRozK8g6tb10Mu== xuzheng@m1-xuzheng
xuzheng@m2-xuzheng:~$
```

Comprobamos conectando desde m1 a m2:

```
xuzheng@m1-xuzheng:~$ ssh -p 2222 xuzheng@192.168.56.71
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.4.0-144-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

System information as of vie 24 mar 2023 20:15:04 UTC

System load:  0.0               Processes:    121
Usage of /:   42.4% of 8.02GB   Users logged in: 1
Memory usage: 14%              IPv4 address for enp0s3: 10.0.2.15
Swap usage:  0%               IPv4 address for enp0s8: 192.168.56.71

25 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '22.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Fri Mar 24 20:04:00 2023
xuzheng@m2-xuzheng:~$ exit
logout
Connection to 192.168.56.71 closed.
xuzheng@m1-xuzheng:~$
```

Como podemos observar, no nos ha pedido la contraseña.

4. Crontab

Para que se sincronice el directorio `/var/www` entre las dos máquinas en cada hora, editamos el archivo `/etc/crontab` como sigue:

```
# /etc/crontab: system-wide crontab
# Unlike any other crontab you don't have to run the `crontab'
# command to install the new version when you edit this file
# and files in /etc/cron.d. These files also have username fields,
# that none of the other crontabs do.

SHELL=/bin/sh
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin

# Example of job definition:
# .----- minute (0 - 59)
# | .----- hour (0 - 23)
# | | .----- day of month (1 - 31)
# | | | .----- month (1 - 12) OR Jan,feb,mar,apr ...
# | | | | .----- day of week (0 - 6) (Sunday=0 or 7) OR sun,mon,tue,wed,thu,fri,sat
# | | | | |
# * * * * * user-name command to be executed
17 * * * * root cd / && run-parts --report /etc/cron.hourly
25 6 * * * root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.daily )
42 5 * * 7 root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.weekly )
52 5 1 * * root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.monthly )
}
0 * * * * xuzheng rsync /var/www/ -avz --delete -e 'ssh -p 2222' 192.168.56.71:/var/www/
```

De forma que en el minuto 0 de cada hora se va a ejecutar **rsync**.

4.1. Opciones avanzadas

Aparte del `*` para indicar todos los valores, también podemos usar entre otras opciones: `-` para indicar el rango de tiempo y `/` para indicar el salto de tiempo. En el siguiente ejemplo, vamos a utilizar **crontab** para escribir la hora en un archivo en cada 90 minutos empezando por la media noche:

```
# /etc/crontab: system-wide crontab
# Unlike any other crontab you don't have to run the `crontab'
# command to install the new version when you edit this file
# and files in /etc/cron.d. These files also have username fields,
# that none of the other crontabs do.

SHELL=/bin/sh
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin

# Example of job definition:
# ----- minute (0 - 59)
# | ----- hour (0 - 23)
# | | ----- day of month (1 - 31)
# | | | ----- month (1 - 12) OR jan,feb,mar,apr,...
# | | | | ----- day of week (0 - 6) (Sunday=0 or 7) OR sun,mon,tue,wed,thu,fri,sat
# | | | | |
# * * * * * user-name command to be executed
07 * * * * root cd / && run-parts --report /etc/cron.hourly
25 6 * * * root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.daily )
47 5 * * 7 root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.weekly )
52 6 1 * * root test -x /usr/sbin/anacron || ( cd / && run-parts --report /etc/cron.monthly )
0
03 * * * * xuzheng rsync /var/www/ -avz --delete -e 'ssh -p 2222' 192.168.56.71:/var/www
00 0-21/3 * * * root date >> /home/xuzheng/hora_log.txt
30 1-22/3 * * * root date >> /home/xuzheng/hora_log.txt
```

5. Bibliografía

- <https://linux.die.net/man/1/scp>
- <https://linux.die.net/man/1/tar>
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